FIG. 1A

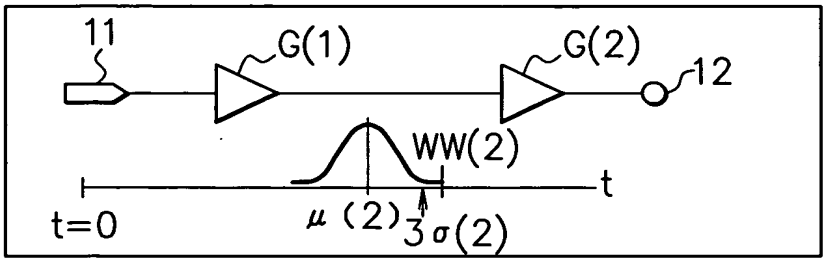



FIG. 1B

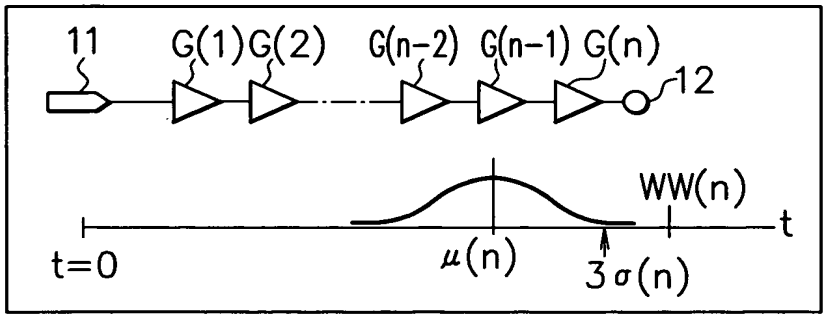
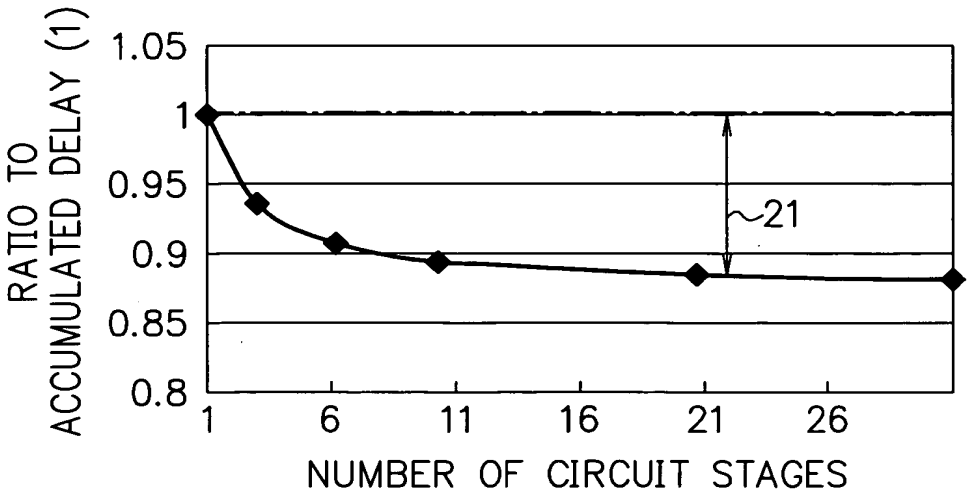



FIG. 2



F I G. 3

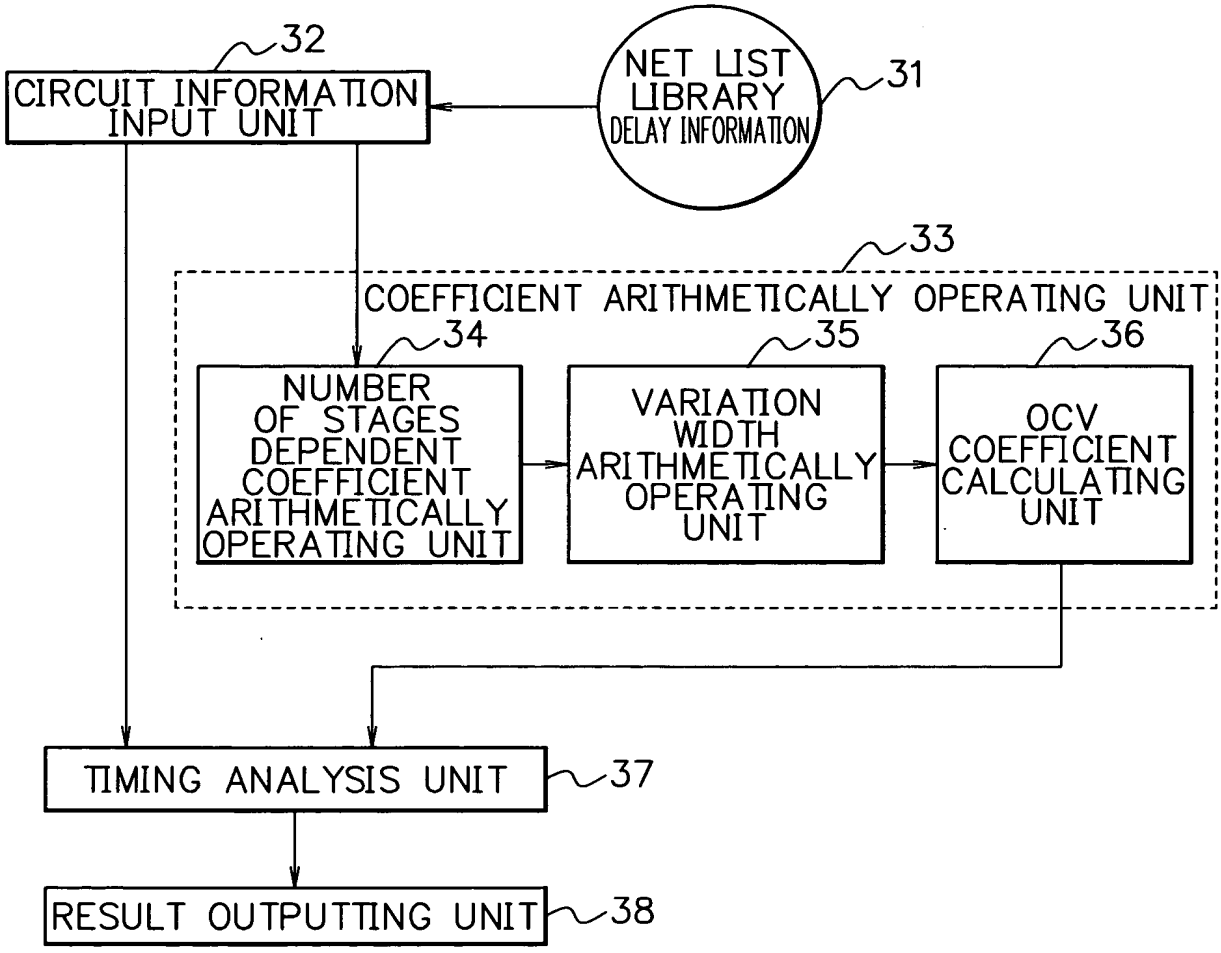

32
CIRCUIT INFORMATION INPUT UNIT
NET LIST LIBRARY DELAY INFORMATION
31
33
COEFFICIENT ARITHMETICALLY OPERATING UNIT
34
NUMBER OF STAGES DEPENDENT COEFFICIENT ARITHMETICALLY OPERATING UNIT
35
VARIATION WIDTH ARITHMETICALLY OPERATING UNIT
36
OCV COEFFICIENT CALCULATING UNIT
TIMING ANALYSIS UNIT
37
RESULT OUTPUTTING UNIT
38

FIG. 4

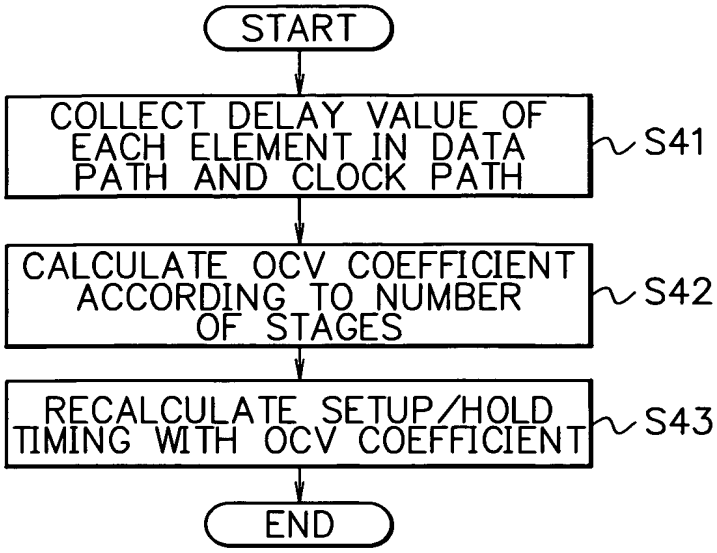
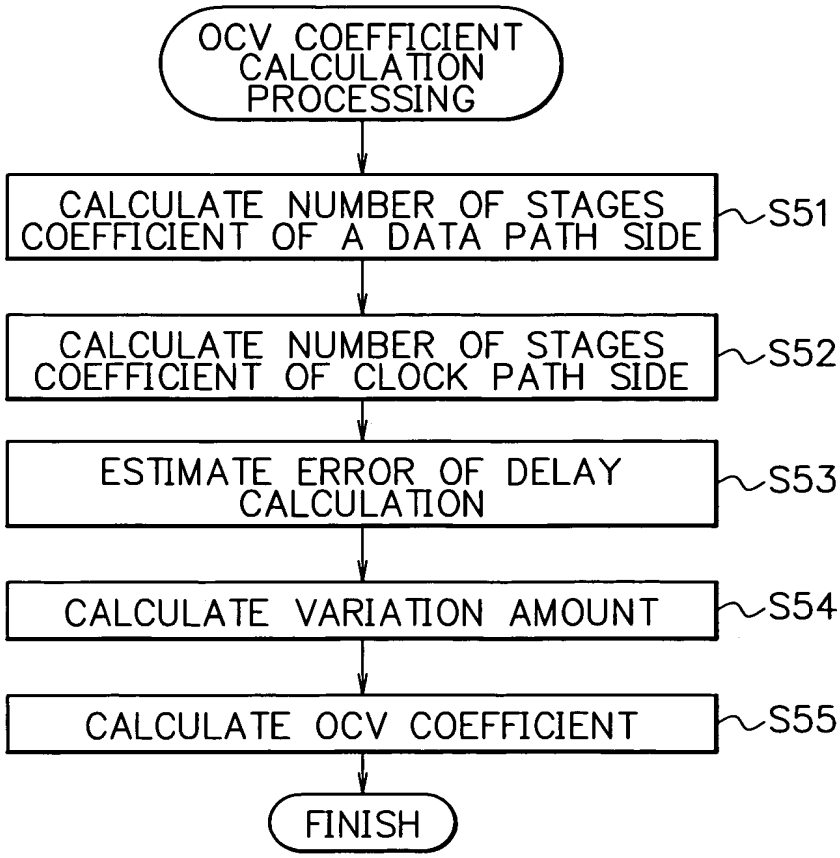
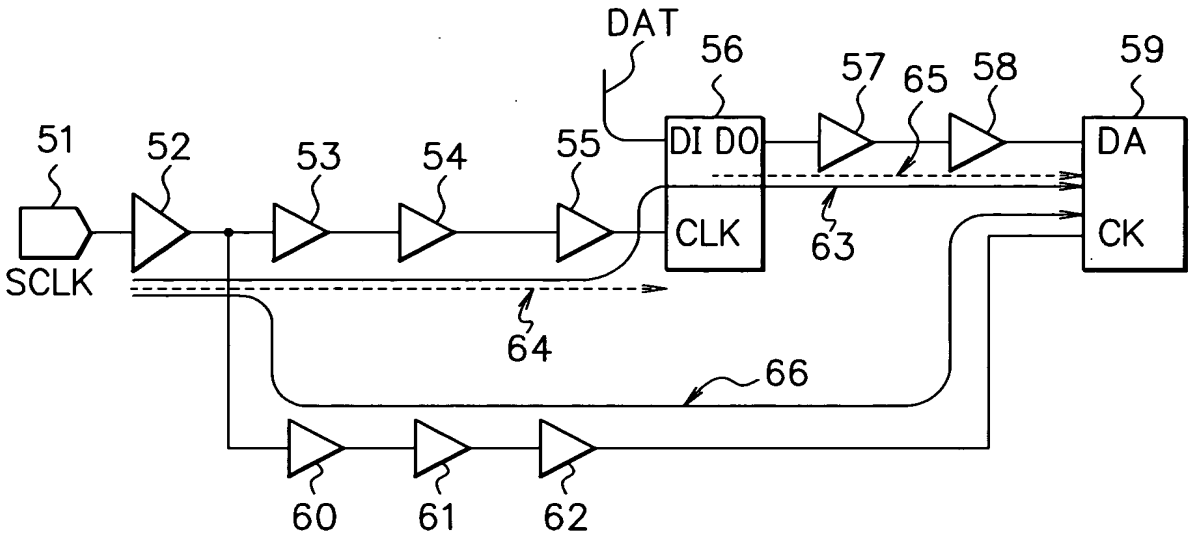

START
COLLECT DELAY VALUE OF EACH ELEMENT IN DATA PATH AND CLOCK PATH
S41
CALCULATE OCV COEFFICIENT ACCORDING TO NUMBER OF STAGES
S42
RECALCULATE SETUP/HOLD TIMING WITH OCV COEFFICIENT
S43
END

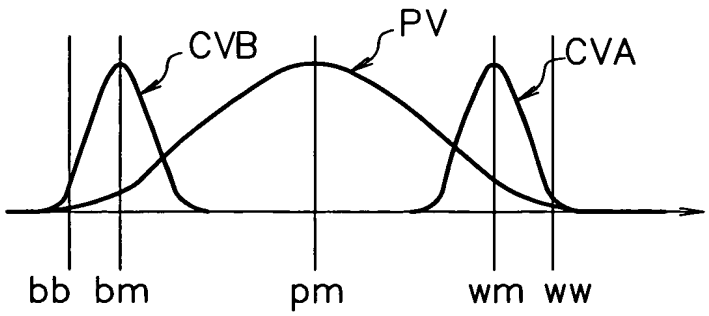
FIG. 5


OCV COEFFICIENT CALCULATION PROCESSING
CALCULATE NUMBER OF STAGES COEFFICIENT OF A DATA PATH SIDE
S51
CALCULATE NUMBER OF STAGES COEFFICIENT OF CLOCK PATH SIDE
S52
ESTIMATE ERROR OF DELAY CALCULATION
S53
CALCULATE VARIATION AMOUNT
S54
CALCULATE OCV COEFFICIENT
S55
FINISH

F I G. 6A


DAT
56
57
65
58
59
51
52
53
54
55
DI DO
DA
CLK
CK
63
SCLK
64
66
60
61
62

F I G. 6B


CVB
PV
CVA
bb
bm
pm
wm
ww

F I G. 7

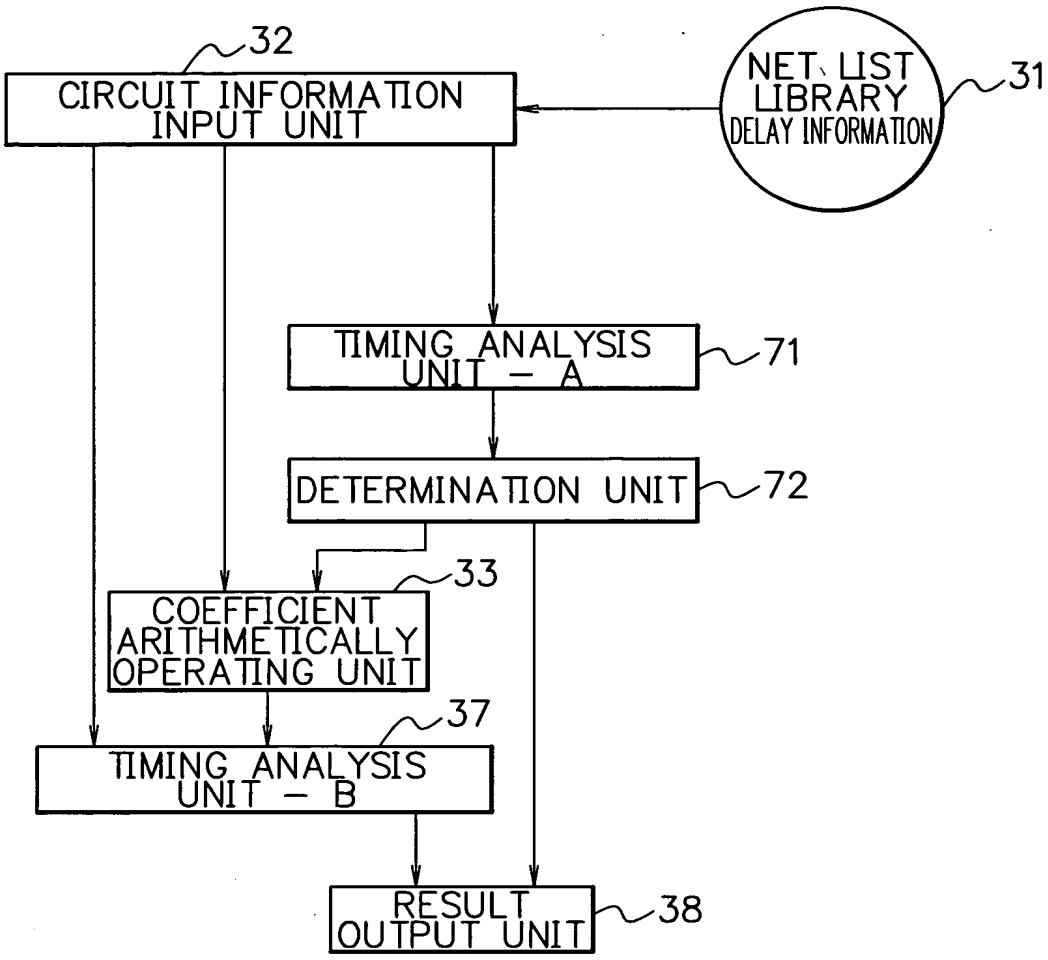

32
CIRCUIT INFORMATION INPUT UNIT
NET LIST LIBRARY DELAY INFORMATION
31
TIMING ANALYSIS UNIT – A
71
DETERMINATION UNIT
72
33
COEFFICIENT ARITHMETICALLY OPERATING UNIT
37
TIMING ANALYSIS UNIT – B
RESULT OUTPUT UNIT
38

FIG. 8

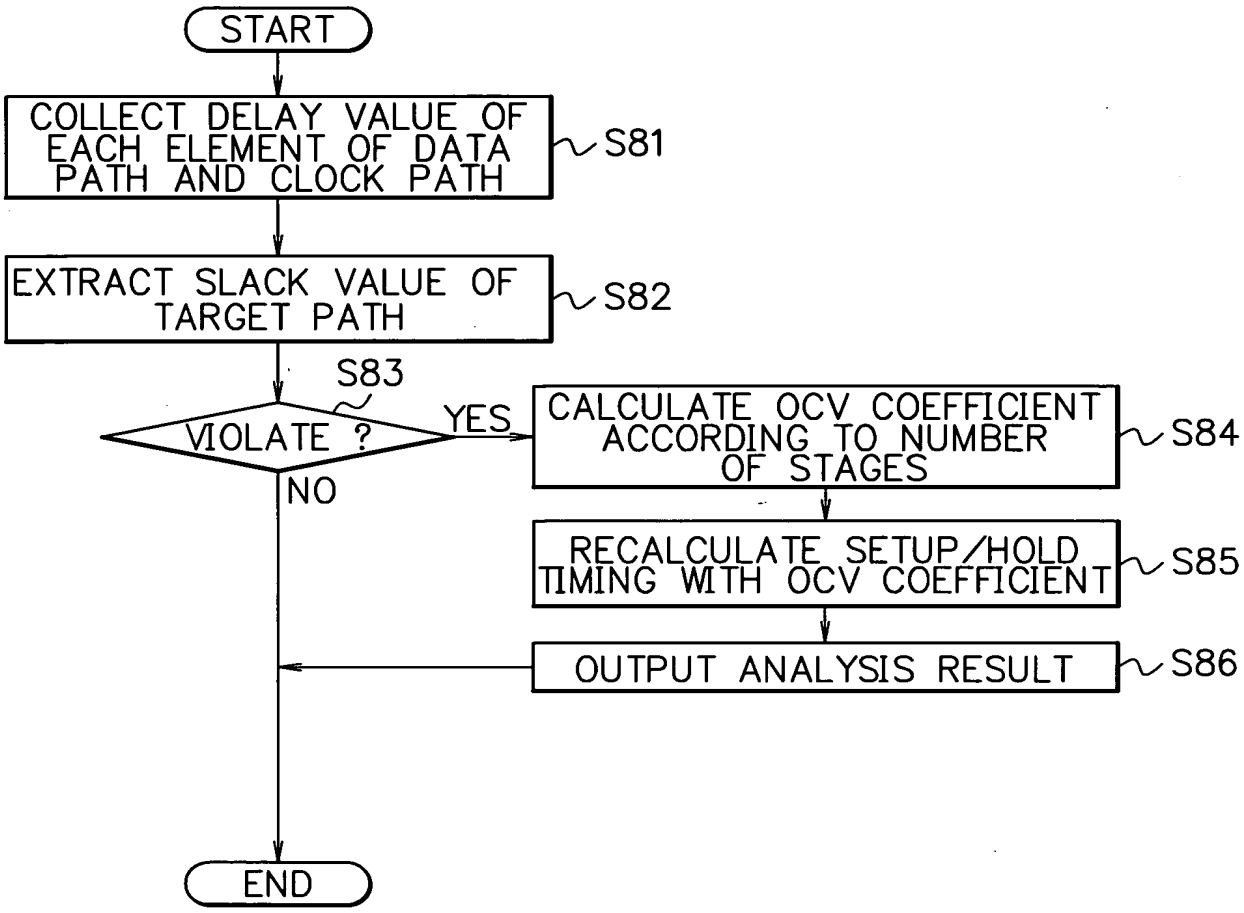

START
COLLECT DELAY VALUE OF EACH ELEMENT OF DATA PATH AND CLOCK PATH
S81
EXTRACT SLACK VALUE OF TARGET PATH
S82
S83
VIOLATE ?
YES
NO
CALCULATE OCV COEFFICIENT ACCORDING TO NUMBER OF STAGES
S84
RECALCULATE SETUP/HOLD TIMING WITH OCV COEFFICIENT
S85
OUTPUT ANALYSIS RESULT
S86
END

FIG. 9A

| NUMBER OF STAGES | 1 | 3 | 5 | 10 | 20 | 40 |
|---|---|---|---|---|---|---|
| Kn_max | 1 | 0.94 | 0.92 | 0.90 | 0.89 | 0.88 |
| | | | | | | |
| NUMBER OF STAGES | 1 | 3 | 5 | 10 | 20 | 40 |
| Kn_min | 1.00 | 1.08 | 1.11 | 1.13 | 1.15 | 1.16 |

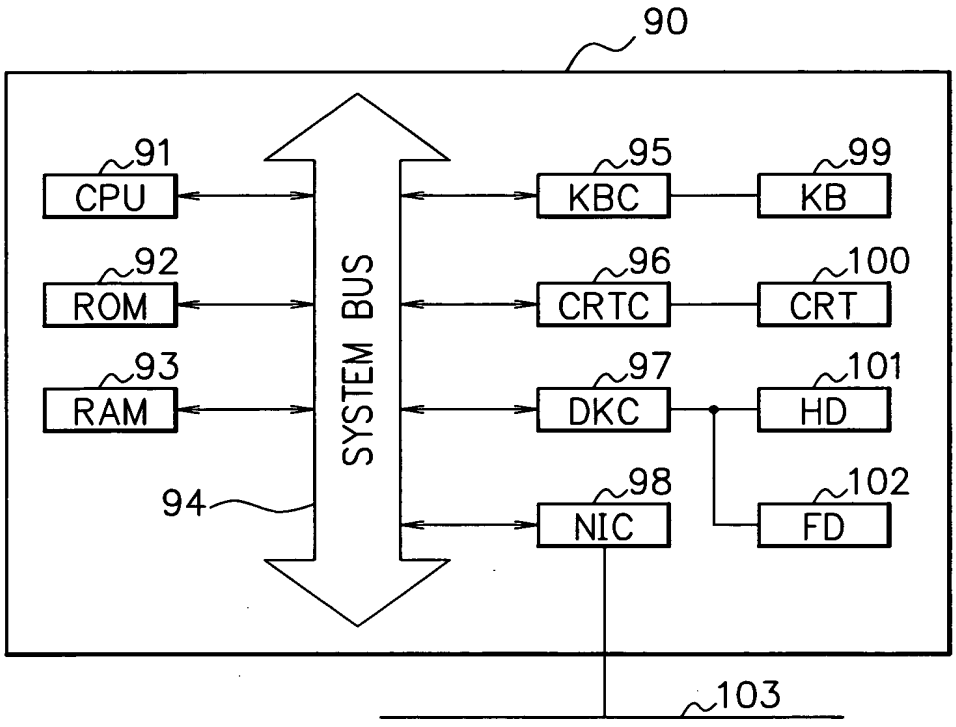
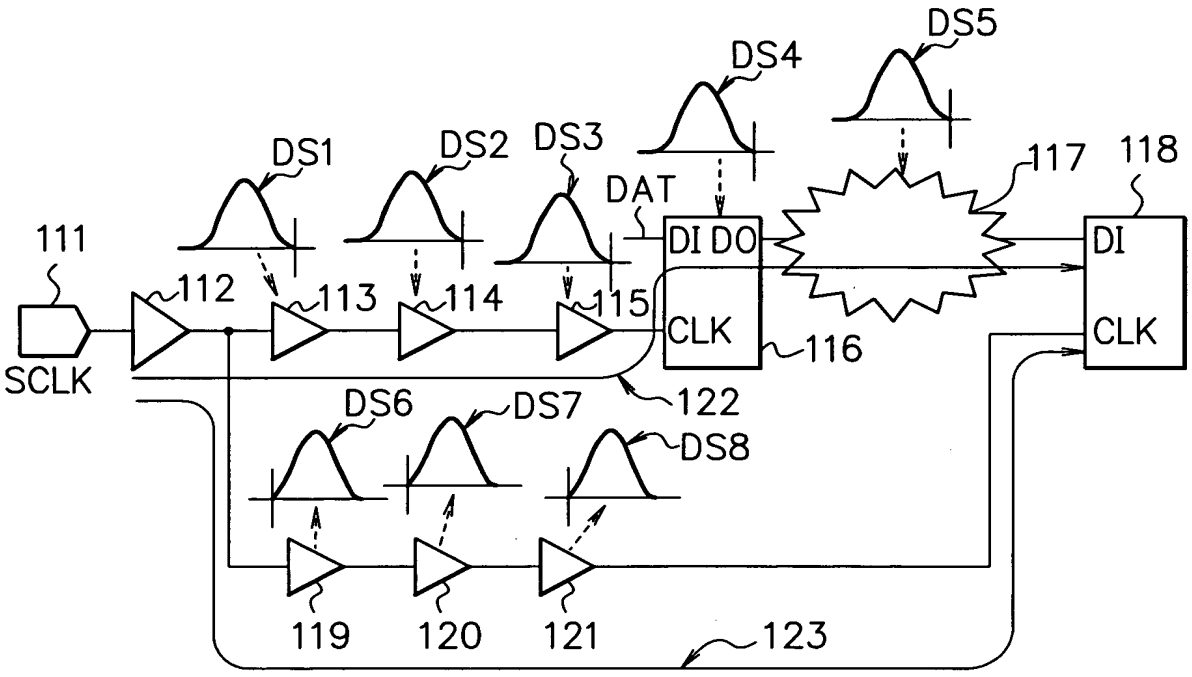
FIG. 9B

| Kn_max | | | | | | |
|---|---|---|---|---|---|---|
| BETWEEN FFS | CK | | | | | |
| | 1 | 3 | 5 | 10 | 20 | 40 |
| 1 | 0.98 | 0.95 | 0.93 | 0.91 | 0.89 | 0.88 |
| 3 | 0.93 | 0.92 | 0.91 | 0.90 | 0.89 | 0.88 |
| 5 | 0.91 | 0.90 | 0.90 | 0.89 | 0.89 | 0.88 |
| 10 | 0.89 | 0.89 | 0.89 | 0.88 | 0.88 | 0.87 |
| 20 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 | 0.87 |

FIG. 9C

| Kn_min | | | | | | |
|---|---|---|---|---|---|---|
| BETWEEN FFS | CK | | | | | |
| | 1 | 3 | 5 | 10 | 20 | 40 |
| 1 | 1.03 | 1.07 | 1.09 | 1.12 | 1.14 | 1.16 |
| 3 | 1.09 | 1.10 | 1.11 | 1.13 | 1.14 | 1.16 |
| 5 | 1.12 | 1.12 | 1.13 | 1.14 | 1.15 | 1.16 |
| 10 | 1.14 | 1.14 | 1.15 | 1.15 | 1.15 | 1.16 |
| 20 | 1.16 | 1.16 | 1.16 | 1.16 | 1.17 | 1.17 |

F I G. 10


90
91
CPU
92
ROM
93
RAM
94
SYSTEM BUS
95
KBC
96
CRTC
97
DKC
98
NIC
99
KB
100
CRT
101
HD
102
FD
103

F I G. 11
PRIOR ART